

WHAT IS CLAIMED IS:

1. A method of biaxially stretching a polymeric film, the method comprising the steps of:

5 a) imparting a sufficiently high temperature to the film to allow a significant amount of biaxial stretch; and

b) biaxial tenter stretching the film to a final first direction stretch parameter and a final second direction stretch parameter, wherein at least 75% of the final first direction stretch parameter is attained before no more than 50% of the final second direction stretch parameter is attained, and wherein the final first direction stretch
10 parameter is no greater than the final second direction stretch parameter.

2. The method of claim 1, wherein step b) comprises biaxial tenter stretching the film such that a substantial portion of the first direction stretch and the second direction stretch is performed simultaneously.
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3. The method of claim 1, wherein at least 90% of the final first direction stretch parameter is attained before no more than 50% of the final second direction stretch parameter is attained.

20 4. The method of claim 1, wherein the first direction is the MD and the second direction is the TD.

5. The method of claim 1, wherein the final first direction stretch parameter is less than the natural stretch parameter for a proportional stretch profile.
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6. The method of claim 1, wherein the final first direction stretch parameter is less than the uniaxial natural stretch parameter.

7. The method of claim 1, wherein the film comprises a thermoplastic
30 film.

8. The method of claim 7, wherein the film comprises a semi-crystalline film.

9. The method of claim 8, wherein the film comprises a polyolefin.

10. The method of claim 9, wherein the film comprises polypropylene.

11. The method of claim 1, wherein step b) further comprises grasping the film with a plurality of clips along the opposing edges of the film and propelling the clips at varying speeds in the machine direction along clip guide means that diverge in the transverse direction.

12. The method of claim 1, wherein step b) further includes stretching the film to more than 100% of the final first direction stretch parameter before no more than 50% of the final second direction stretch parameter is attained, and thereafter retracting the film in the machine direction to the final first direction stretch parameter.

13. The method of claim 12, wherein a significant portion of the retraction is performed simultaneously with a portion of the second direction stretch.

14. The method of claim 1, wherein step b) further includes stretching the film to a peak first direction stretch parameter that is at least 1.2 times the final first direction stretch parameter, and thereafter retracting the film in the first direction to the final first direction stretch parameter.

15. The method of claim 14, wherein a significant portion of the retraction is performed simultaneously with a portion of the second direction stretch.

16. The method of claim 14, wherein step b) further includes stretching the film to the peak first direction stretch parameter before no more than 50% of the final second direction stretch parameter is attained.

17. A film obtained by the method of claim 1.

18. A tape comprising a backing including a first major surface and a layer
5 of adhesive on said first major surface, wherein said backing comprises the film of
claim 17.

19. A method of biaxially stretching a polypropylene film, the method
comprising the steps of:

10 a) imparting a sufficiently high temperature to the film to allow a significant
amount of biaxial stretch; and

b) biaxial tenter stretching the film to a final first direction stretch parameter
and a final second direction stretch parameter, wherein:

15 i) a substantial portion of the first direction stretch and second
direction stretch is performed simultaneously;

ii) at least 90% of the final first direction stretch parameter is attained
before no more than 50% of the final second direction stretch parameter is
attained

20 iii) the final first direction stretch parameter is not greater than the
final second direction stretch parameter; and

iv) the final first direction stretch parameter less than the natural
stretch parameter for a proportional stretch profile.

20. A film obtained by the method of claim 19.

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21. A tape comprising a backing including a first major surface and a layer
of adhesive on said first major surface, wherein said backing comprises the film of
claim 20.

22. A method of biaxially stretching a polymeric film, the method comprising the steps of:

a) imparting a sufficiently high temperature to the film to allow a significant amount of biaxial stretch; and

5 b) biaxial tenter stretching the film according to a stretch profile to a final first direction stretch parameter and a final second direction stretch parameter, wherein the final first direction stretch parameter is no greater than the final second direction stretch parameter, and wherein:

10 i) a straight line between the point defining zero stretch parameter and the point defining the final first and second direction stretch parameters represents a proportional stretch profile and defines a proportional stretch area; and

15 ii) the curve representing the stretch profile between the point defining zero stretch parameter and the point defining the final first and second direction stretch parameters defines an area at least 1.4 times the proportional stretch area.

23. The method of claim 22, wherein step b) comprises stretching the film such that:

20 the curve representing the stretch profile between the point defining zero stretch parameter and the point defining the final first and second direction stretch parameters defines an area at least 1.7 times the proportional stretch area.

25 24. The method of claim 22, wherein step b) comprises stretching the film such that a substantial portion of the first direction stretch and second direction stretch is performed simultaneously.

30 25. The method of claim 22, wherein the first direction is the MD and the second direction is the TD.

26. The method of claim 22, wherein step b) comprises stretching the film to a final first direction stretch parameter less than the natural stretch parameter for a proportional stretch profile.

5 27. The method of claim 22, wherein step b) comprise stretching the film to a final first direction stretch parameter less than the uniaxial natural stretch parameter.

10 28. The method of claim 22, wherein the film comprises a thermoplastic film.

29. The method of claim 28, wherein the film comprises a semi-crystalline film.

15 30. The method of claim 29, wherein the films comprises a polyolefin.

31. The method of claim 30, wherein the film comprises polypropylene.

20 32. The method of claim 22, wherein step b) further comprises grasping the film with a plurality of clips along the opposing edges of the film and propelling the clips in the machine direction along clip guide means that diverge in the transverse direction.

25 33. The method of claim 22, wherein step b) further includes stretching the film to more than 100% of the final first direction stretch parameter before no more than 50% of the final second direction stretch parameter is attained and thereafter retracting the film in the first direction to the final machine direction stretch parameter.

30 34. The method of claim 33, wherein a significant portion of the retraction is performed simultaneously with a portion of the second direction stretch.

35. The method of claim 22, wherein step b) further includes stretching the film to a peak first direction stretch parameter that is at least 1.2 times the final first direction stretch parameter, and thereafter retracting the film in the first direction to the final first direction stretch parameter.

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36. The method of claim 35, wherein a significant portion of the retraction is performed simultaneously with a portion of the second direction stretch.

37. The method of claim 35, wherein step b) further includes stretching the film to the peak first direction stretch parameter before no more than 50% of the final second direction stretch parameter is attained.

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38. A film obtained by the method of claim 22.

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39. A tape comprising a backing including a first major surface and a layer of adhesive on said first major surface, wherein said backing comprises the film of claim 38.

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40. A method of biaxially stretching a polypropylene film, the method comprising the steps of:

a) imparting a sufficiently high temperature to the film to allow a significant amount of biaxial stretch; and

b) biaxial tenter stretching the film according to a stretch profile to a final first direction stretch parameter and a final second direction stretch parameter, wherein:

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i) a substantial portion of the first direction stretch and second direction stretch is performed simultaneously;

ii) a straight line between the point defining zero stretch parameter and the point defining the final first and second direction stretch parameters represents a proportional stretch profile and defines a proportional stretch area; and

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iii) the curve representing the stretch profile between the point defining zero stretch parameter and the point defining the final first and

second direction stretch parameters defines an area at least 1.4 times the proportional stretch area;

iv) the final first direction stretch parameter is no greater than the final second direction stretch parameter; and

5 v) the final first direction stretch parameter is less than the natural stretch parameter for a proportional stretch profile.

41. A film obtained by the method of claim 40.

10 42. A tape comprising a backing including a first major surface and a layer of adhesive on said first major surface, wherein said backing comprises the film of claim 41.

15 43. The method of claim 1, wherein the final second direction stretch parameter is greater than the natural stretch parameter for a proportional stretch profile.

44. The method of claim 1, wherein the final second direction stretch parameter is greater than the uniaxial natural stretch parameter.

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45. The method of claim 22, wherein step b) comprises stretching the film to a final second direction stretch parameter greater than the natural stretch parameter for a proportional stretch profile.

25 46. The method of claim 22, wherein step b) comprise stretching the film to a final second direction stretch parameter greater than the uniaxial natural stretch parameter.